

2006 CCRTS

THE **S**TATE OF THE **A**RT AND THE **S**TATE OF THE **P**RACTICE

Command World

C2 Experimentation; C2 Architecture; C2 Modeling and Simulation

Leah Wong and Douglas S. Lange

POC: Douglas S. Lange

SPAWARSYSCEN San Diego

SPAWARSYSCEN

53560 Hull Street

San Diego, CA 92152-5001

619-553-6534/619-553-5322

doug.lange@navy.mil

Jerome Thomas Sebastyn

SPAWAR Naval Reserves Unit 1010

William H. Roof

SPAWAR Naval Reserves Unit 406

Abstract

Command World is an unclassified simulation used to create data for DARPA's Personalized Assistant that Learns (PAL) program. The Command World scenario was expressly designed as a crisis action planning exercise in order to replicate the communications, collaboration, and information requirements inherent in a military domain and to facilitate realistic and relevant communications and collaboration exchanges across an information system network. The development of a robust and unclassified scenario and all of the supporting training artifacts was integral to the program goals of process execution, transfer learning, and the eventual development of a bootstrap ontology for PAL use in a military environment. The PAL program is designed to explore the possibility of creating tools that will assist military planners in their tasks through the use of digital "assistants." By instrumenting the environment over 5 experiments, over 200,000 events were captured. This paper will describe the environment, the data collected, and how the data is being used.

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Introduction

Defense Advanced Research Projects Agency (DARPA) has initiated the Personalized Assistant that Learns (PAL) program - a cognitive technology program that offers significant value not only to the military user community, but also to business and academic sectors. The project aim is to spur pioneering research in cognitive information processing - including areas of artificial intelligence (AI), machine learning, knowledge representation and reasoning, machine perception, natural language processing, and behavioral studies. DARPA envisions PAL as an “enduring personalized cognitive assistant” to help decision-makers manage their complex worlds of multiple simultaneous tasks and unexpected situations. [Gunning 2004]

PAL’s original focus was as an office assistant tasked with scheduling meetings, handling correspondence and assisting with quarterly reports. The concept behind PAL technology was to lend assistance by observing and interacting with office workers. Commercial software, e-mail and scheduling programs will be adapted for PAL purposes. PAL will augment these functions by adding modules that will train the software to recognize users’ preferences, and by adding components that will decide when to interrupt the user with questions. DARPA hopes the research will lead to systems that can reason, learn from experience, take advice and respond intelligently to new situations.

Command World Simulation Exercise

In conjunction with the Naval Postgraduate School (NPS), Space and Naval Warfare Systems Center San Diego (SSC San Diego) was tasked to develop the Command World for performing evaluations of PAL technology in support of transition efforts. One of the Command World objectives is to develop military simulation exercises to support data collection, initially without PAL software, and then with increasingly functional, iterative versions of PAL software, in order to support transition of PAL technologies to a military environment. SSC San Diego with NPS conducted a series of Command World exercises – with each exercise testing and evaluating improved PAL functionality since September 2004.

“Operation CROWN JEWEL” Scenario

Operation CROWN JEWEL is a simulation for producing data for the Command World project. This data is a critical component of assessing the effectiveness of software assistants to support planning and coordination activities. The intent of Operation CROWN JEWEL is to develop baseline data relative to the IM tools used by joint planners in fulfilling their planning responsibilities. DARPA will use this data to support the CALO project. CALO will explore the possibility of creating tools that will assist military planners in their tasks through the use of digital “assistants.” Since these assistants must “understand” the planner’s tasks and how the planner accomplishes them, Command World contractors conduct a series of simulations where these tasks are studied and parameterized. Accordingly, Operation CROWN JEWEL is a laboratory for this effort.

The simulation has a set of participants, each with organizational roles and responsibilities related to the planning and preparatory work supporting a hypothetical

military operation. The scenario and all related data are unclassified. The scenario assumes that participants are members of a Combatant Commander (COCOM) staff assigned planning responsibilities for an anticipated peacekeeping operation in a fictitious world region. Participants use standard Crisis Action Planning (CAP) procedures in accomplishing the tasks assigned during the scenario.

Participants form a joint planning cell at the (COCOM) headquarters. The planning team's objective is to develop the Commander's Assessment and, based on the scenario "trigger events," to conduct a CAP approach and develop a set of Course of Action (COA) alternatives for executing the CROWN JEWEL mission. The exercise scenario includes a full range of peacekeeping operations (PKO), including monitoring treaty agreements, liaison with the respective belligerent nation leaders (i.e., TOPAZ, CORAL), and conducting humanitarian relief operations. This final task could become extensive in view of a resultant refugee problem and will require support of various International Organizations (IO) and Non-Governmental Organizations (NGO), an extensive mine clearance and eradication operation, food and medical assistance, and security operations.

The Exercise Test Director manages Operation CROWN JEWEL, and introduces events at various times thus affecting one or more actions. The participants did not know the nature and timing of these events beforehand. The Exercise Test Director is also responsible for sending email from (fictitious) non-participants. In accordance with standard planning procedures at most joint commands, the Test Director provides an exercise Battle Rhythm to guide participants. Actions taken during the simulation must be within the confines of the exercise Battle Rhythm and under the direction of the Exercise Test Director who functions as the supervisor of the planning and event execution effort.

Data results from conducting simulation sessions where military officers play participant roles using instrumented email, an online calendar, text editor, web browsers and other software to communicate with each other, to collect information needed for specific tasks, and to produce documents. Each participant has a workstation dedicated to the simulation, but with no connection to the participant's real identity or any other private data. In this fashion, a record of all simulation activity can be captured and distributed without privacy concerns. This captured data includes email activity, calendar edits, files created and edited and directory and subdirectory structures created, web browsing activity, etc.

Participants also engage in work activities related to their normal billet assignments (e.g. admin routines such as travel, etc., web search on status of cities, etc.) as well as duties as part of the CAP planning staff. This requires participants to produce some routine reports at specified times, and to complete other tasks related to their role-play assignments. In some cases, participants collect information and solve problems, thereby requiring them to exhibit realistic web, calendar, and file searching actions as part of the data to be collected. Participants create file and directory structures as appropriate for organizing their tasks. To minimize session "real time," participants have basic data (documents, spreadsheets, etc.) to use in the performance of work activities.

Simulation Domain

The scenario utilized in this exercise is from an actual USJFCOM J7 unclassified exercise, modified to meet the data collection requirements best suited to test the capabilities of CALO during an operational planning event.

The knowledge domain for Operation CROWN JEWEL in the scenario simulation is the CAP process at a COCOM headquarters. Additionally, the knowledge domain will encompass a small set of routine daily tasks that must be balanced with CAP duties by the participants. The scenario and sequence of events are intended as generic in nature and are not intended to be specific to any particular unified command or unified command geographic region. Moreover, the CROWN JEWEL scenario is unclassified and is not intended to represent any particular U.S. operational military plan or potential real world crisis. Rather, the scenario is intended to reflect the operational issues that would confront a COCOM planning staff tasked with preparing for joint or multi-national force operations in its assigned area of responsibility (AOR).

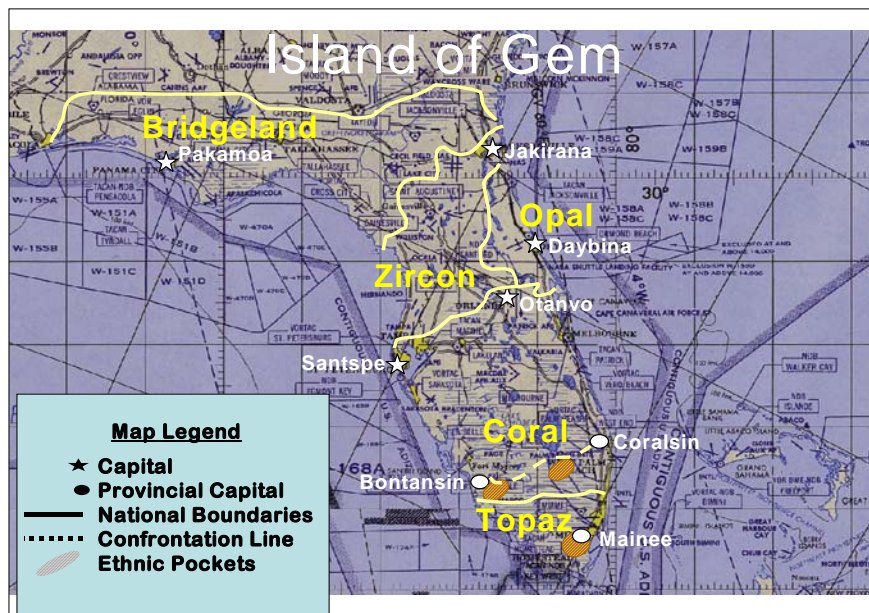
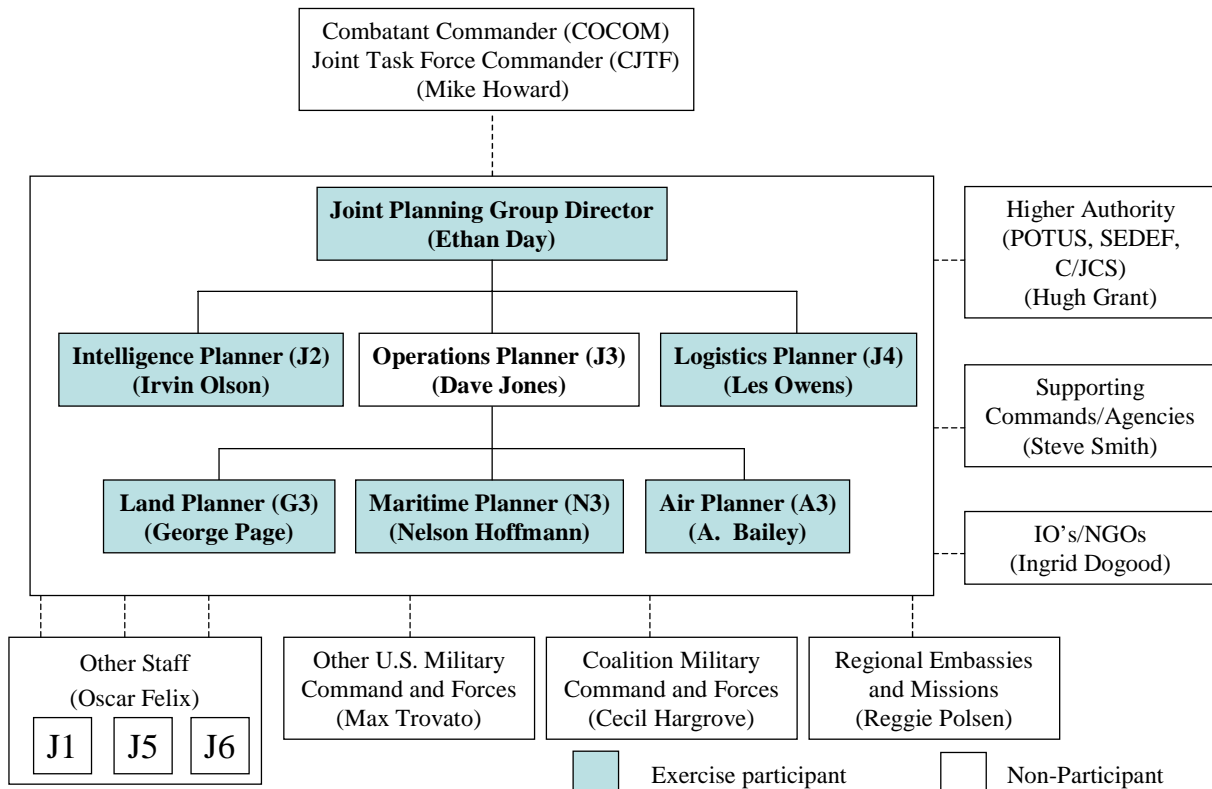


Figure 1: Map of the Island of Island nations of GEM

JOINT PLANNING TEAM STRUCTURE

The planning team is composed of six military officers with experience in joint planning. This will include one intelligence planner, one logistics planner, and three joint force planners (i.e., Land Component Planner, Maritime Component Planner, Air Component Planner), preferably one from each of the major services, U.S. Army, U.S. Navy, U.S. Air Force. The senior member of the team will be the Joint Planning Group Director who will act as both the senior member of the team and exercise mediator among the non-participant roles and corresponding game cues.

Operation CROWN JEWEL Joint Planning Group Structure



MAJOR TASKS

The planning team will produce the information products generally required at a COCOM headquarters during routine operations as a crisis develops. During Operation CROWN JEWEL, the participants will accomplish the essential step in the first three phase of CAP – Situation Development, Crisis Assessment, and COA Development by accomplishing the following:

- Review of incoming intelligence and other source data
- Commence CAP process for a PKO under COCOM direction
- Prepare and submit a daily Commander's briefing (using slideware) to COCOM; prepare a daily operations summary message (OPSUM)
- Respond to increasing exercise tempo as Operation CROWN JEWEL begins

During Operation CROWN JEWEL, the participants will produce the following products:

- Daily Commander's briefing, OPSUM

- Commander's Assessment message
- A mission analysis based on Chairman, Joint Chiefs of Staff (C/JCS) Warning Order (WARNORD) COA's (e.g., three alternative plans) for executing the mission assigned
- Briefing on recommended COA's
- Major triggering events
- General situational data on scenario
- "Spot" intelligence reports as scenario develops
- Own force data – disposition, location, readiness
- Updated information from open, non-military sources – IO's, NGOs, Media (e.g., CNN), etc.
- Direction from higher authority – intentions, deadlines, requests for intelligence / information (RFI's)
- Planned duration

This simulation spreads four weeks of simulated time over a predetermined number of days of actual data collection. Depending upon the desired Battle Rhythm, the Exercise Test Director may choose to conduct the simulation over a period anywhere from 2.5 contiguous days, to 8 days of intermittent exercise play. The Exercise Test Director will control the time allotted to specific tasks in the CAP process with a simulated Battle Rhythm. This causes the participants to accomplish specific steps in the CAP process while under the simulated conditions of routine AOR operations (exercise scenario start) building to a large-scale multi-national force (MNF) operation. As the scenario simulation progresses it is expected that participants will gradually shift individual orientation and task accomplishment to group collaboration and integrated task accomplishment required by the exercise rigor imposed by the nature of the scenario operation.

SCENARIO PRODUCTS

Products resulting from this scenario consisted mainly of emails, MS Word Documents, MS Excel Spreadsheets and MS PowerPoint presentations. These products resulted from the script stimuli and the form and format of the response data was completely at the discretion of the participant. The form and format of the products resulted from the participants' comfort levels with the available applications and the time allotted to the task. Specific products produced from this joint operation planning exercise include:

- Operations Brief (daily): Status update on force disposition and availability
- Operation Summary (daily): Status update on force readiness
- Commander's Assessment (Phase I): Situational Development based upon nature of crisis, intelligence reports, force readiness, refining mission concept (e.g. factors of space, time, and resources), and preliminary COA
- Commander's Estimate (Phase III): Mission statement, Situation Update COA (three), COA constraints and additional planning concerns

- “Free play” products: Administrative requests, requests for information (RFI) germane to gameplay

Experimentation

The Command World Exercises were conducted in the Command World lab at NPS. Each participant was provided with a notebook computer networked to a central server where events logged into a database in the Timeline server. The server also provided the participants with Internet access, Microsoft Exchange, and other web services.

All the laptops, servers and users, were connected via Ethernet behind (on the LAN side of) the NetGear router/switch. Firewall protection was provided on the Internet side of the NetGear by the NPS network. Two of the user laptops and the server were connected directly to the local LAN ports on the back of it using network cables. Another network cable was connected from the NetGear to a hub. The remaining user laptops were connected to the hub. The laptops could browse the WWW subject to any restrictions imposed by the NPS network that we used for connectivity to the Internet.

After the initial training briefings in the morning session of the first day, the Exercise Test Director provided the participants with simulation stimuli to generate responses that required the participants to use the hardware and software tools provided by the exercise principals. This offered an opportunity to familiarize with some of the non-standard keystrokes required to log some events, such as saving email attachments to the participants’ hard drives. Participants had the opportunity to ask questions and to clarify issues that would be important throughout the conduct of the exercise.

SRI personnel provided NPS personnel and the participants with training pertaining to the CALO instrumentation. Dedicated NPS personnel built and tested the experiment laboratory at the NPS and assisted SRI and the participants throughout the exercise with network and system administration support. NPS and SRI personnel also monitored and archived all instrumented data upon completion of the exercise.

Data Collection

Each participant notebook computer hosted a client that logged all MS Office activities to a central database on the networked CALO server via the following software modules.

FileSystemWatcher (FSW): Monitors the file system and log events when file system changes. The events are logged to a file in the CALO Timeline Server that records all activity in My Documents and the subfolders.

Internet Explorer (IE) Plug-in: Captures user actions in IE and Microsoft file Explorer. It logs navigation and events to the CALO Timeline Server for indexed archival.

MS Outlook: Captures relatively "fine-grained" instrumentation of email, calendar, appointments, and contact transactions by users of MS Outlook. It logs these transactions as CALO events and writes these events to a local file and/or sends them to the CALO timeline server for indexed archival. In this release of CALO software, file attachments must be saved using the CALO drop-down menu from the main page.

Outlook Plug-In: Captures email, contact and appointment events in Outlook and logs the event data to the local file system and to the TimeLine Server via OAA 2.3.0.

Timeline Server: Archives and indexes CALO events sent by FileSystemWatcher and MS Outlook Mail via OAA 2.3.0. and provides search and subscription capabilities across this data.

Timeline Viewer: A simple GUI for searching events stored in the Timeline Server.

Each participant performed tasks associated with the real-world staff position they represented. All participant tasks supported the Joint Crisis Action Planning Model used by US Military personnel assigned to Joint Planning staffs.

It was critical to exercise realism that the participants provided a number of ad-lib events, all unknown to the other participants prior to their injections into the scenario. For example, J2 injected an ad-lib event by reporting a captured TOPAZ soldier carried a chemical protective mask and nerve gas antidote. This generated the appropriate message traffic that would warn peacekeepers of a potential chemical agent or biological threat. Later, J2 again injected an ad-lib event indicating the simultaneous detonation of car bombs near peacekeeping bases.

Each participant injected events pertaining to their area of expertise. J4 reported the crash of an aircraft carrying medical supplies, while N3 reported treacherous sea states caused by the proximity of a hurricane. These and other events represent the type of unplanned stimuli that would generate a flurry of activity throughout the staff.

Experimentation Results

The exercise provided enhancement to coherent and logical information transmission over information system network along with enhancement to processing and storage of information over information system.

Outlook was the primary software tool used by the participants during the exercise. According to the participants, their use of the available software tools broke out as follows:

The collected data from each exercise is summarized in the following tables.

Command World Simulation Exercise #1 Event Data Collection

| Event Type | Thru 7/26 | 7/27 | 7/28 | Totals |
|--------------------------|----------------------|-------------|-------------|---------------|
| OutlookIA TimeLineSearch | 171 | 727 | 664 | 1391 |
| OutlookIA | 3971 | 16288 | 15116 | 31404 |
| IE_PLUGIN | 1171 | 847 | 1280 | 2127 |
| File Events | 1156 | 3609 | 3080 | 6689 |
| Totals: | 6771 | 21471 | 20140 | 41611 |

Command World Simulation Exercise #2 Event Data Collection

| Event Type | 9/14 | 9/15 | 9/16 | Totals |
|--------------------------|-------------|-------------|-------------|---------------|
| OutlookIA TimeLineSearch | 98 | 360 | 772 | 1230 |
| OutlookIA | 3121 | 13888 | 28664 | 45673 |
| IE_PLUGIN | 469 | 552 | 2185 | 3206 |
| File Events | 318 | 540 | 1282 | 2140 |
| Totals: | 4006 | 15340 | 32903 | 52249 |

Command World Simulation Exercise #3 Event Data Collection

| Event Type | 1/26 | 1/28 | 1/31 | 2/2 | Totals |
|-------------------|-------------|-------------|-------------|------------|---------------|
| Calendar: | 74 | 48 | 100 | 88 | 310 |
| Web Browser: | 1803 | 1786 | 1291 | 1001 | 5881 |
| File Browser: | 36 | 137 | 27 | 3300 | 3500 |
| E-mail: | 3904 | 2093 | 3162 | 2438 | 11597 |
| Chat: | 610 | 757 | 623 | 534 | 2524 |
| Track: | 41 | 7 | 0 | 1736 | 1784 |
| Task Start: | 252 | 154 | 237 | 241 | 884 |
| Other: | 1035 | 877 | 788 | 858 | 3558 |
| Totals: | 7755 | 5859 | 6228 | 10196 | 30038 |

Command World Simulation Exercise #4 Event Data Collection

| Event Type | 3/9 | 3/11 | 3/14 | 3/16 | Totals |
|----------------------|------------|-------------|-------------|-------------|---------------|
| Calendar: | 57 | 60 | 106 | 135 | 358 |
| Web Browser: | 1490 | 4940 | 1817 | 1558 | 9805 |
| File Browser: | 223 | 0 | 478 | 262 | 963 |
| E-mail: | 8968 | 6420 | 3802 | 5547 | 24737 |
| Chat: | 619 | 641 | 562 | 580 | 2402 |
| Track: | 163 | 757 | 295 | 833 | 2048 |
| Task Start: | 110 | 88 | 180 | 246 | 624 |
| Data Applications: | 48 | 48 | 72 | 99 | 267 |
| CALO Query: | 0 | 0 | 4 | 27 | 31 |
| Change Applications: | 756 | 348 | 666 | 892 | 2662 |
| Totals: | 12434 | 13302 | 7982 | 10179 | 43897 |

Command World Simulation Exercise #5 Event Data Collection

| Event Type | 4/12 | 4/13 | 4/14 | Totals |
|----------------------|-------|-------|-------|--------|
| Calendar: | 204 | 397 | 143 | 744 |
| Web Browser: | 3103 | 4407 | 1677 | 9187 |
| File Browser: | 807 | 1401 | 96 | 4104 |
| E-mail: | 10336 | 21065 | 9216 | 38817 |
| Chat: | 1328 | 3480 | 2479 | 7287 |
| Track: | 928 | 3038 | 747 | 4713 |
| Task Start: | 96 | 202 | 62 | 360 |
| Data Applications: | 74 | 159 | 71 | 304 |
| CALO Query: | 0 | 7 | 0 | 7 |
| Change Applications: | 885 | 1338 | 632 | 2855 |
| Totals: | 17761 | 35494 | 15123 | 68378 |

Use of Data in Learning Capability Development

One of the capabilities being developed in the CALO program is *process execution assistance*. CALO helps the user to perform tasks. In order for CALO to do this, observation of the user's activities is necessary. To test CALO learning algorithms, developers will be able to use Command World data just as if their modules were monitoring the progress of the exercise in real time.

Many of the capabilities for CALO are designed for learning. Most of the testing is being done in an office automation environment where events are plentiful in a real world environment without adding significant risk. However, this means that CALO is learning about a different environment than we are targeting. Another use of the Command World data is to compare the behavior of CALO when provided events from the military environment and indeed determine if the learning being done in the office environment is benefiting use later in the military environment. These tests of *transfer learning* were performed in the last iteration of Command World by researchers from MIT and Oregon State University with the assistance of NPS and SSC SD personnel. Some of the results are published in [Marx+ 2005].

The final use of the data being collected is the eventual development of a bootstrap ontology for PAL use in a military environment. By collecting events and the associated data, we have data that will support knowledge of a crisis action planning situation in a command staff environment.

Summary

In support of data collection for the CALO leaning algorithm development, the Command World exercises, were conducted over eleven days, generated 236,173 logged events. The exercise was a success in that it demonstrated that the scenario scripts were sufficient for the participants to perform the essential CAP tasks, and collected data that

will be useful for further study. It also provided realistic baseline data from a military domain for the test and evaluation of CALO software, once learning capabilities are sufficiently mature to run further tests. The baseline data will be useful in comparing those later results in determining whether efficiency and effectiveness were improved through learning. We had the benefits of having reservists as exercise participants who brought in their experience from both the military and technical environments as they work in technical positions in their civilian careers. Their professionalism, which was demonstrated by freely played their roles in the simulation, contributed to the success of generating large quantity of high quality data.

The collected data is releasable to researchers within the government and those under contract with the government for relevant research.

References

- [Gunning 2004] Gunning, D., “Beyond Science Fiction: Building a Real Cognitive Assistant”, DARPATech 2004.
- [Marx+ 2005] Marx, Z., Rosenstein, M., Kaelbling, L., and Dietterich, T, “Transfer learning with an ensemble of background tasks “,NIPS 2005 Workshop on Inductive Transfer: 10 Years Later, 2005.



Command World

C2 Modeling and Simulation

Leah Wong and Douglas S. Lange
SPAWARSYSCEN San Diego

CDR J.T. Sebastyn
SPAWAR NAVRES Unit 1010

CAPT William H. Roof
SPAWAR NAVRES Unit 406



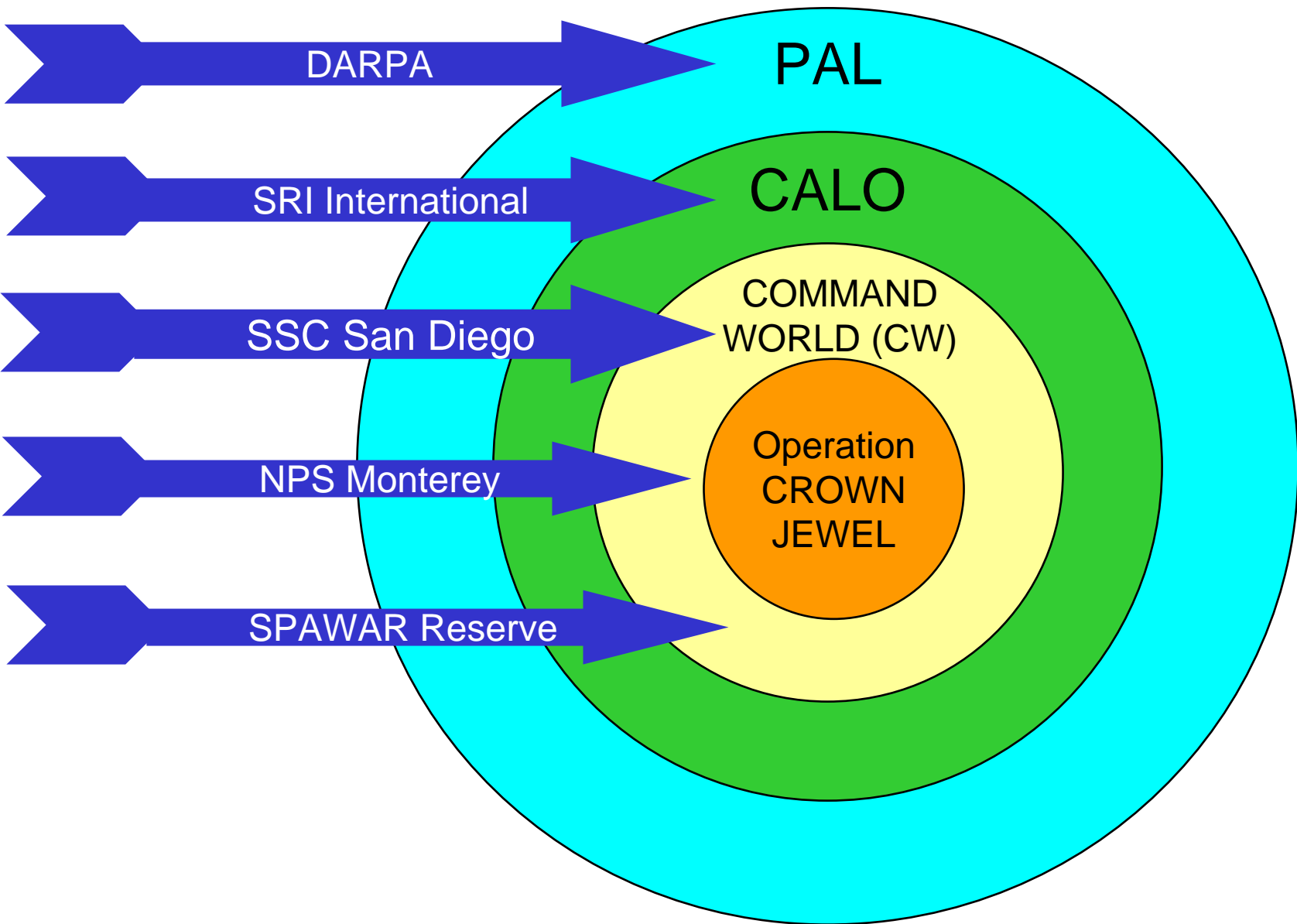
Overview



- Introduction
- DARPA Personalized Assistant that Learns (PAL)
- Cognitive Assistant that Learns and Organizes (CALO)
- COMMAND WORLD
 - Crisis Action Planning (CAP) Model
 - Operation CROWN JEWEL Scenario
- Simulation Domain / Experimentation
- Data Collection
- Summary & Questions



Introduction



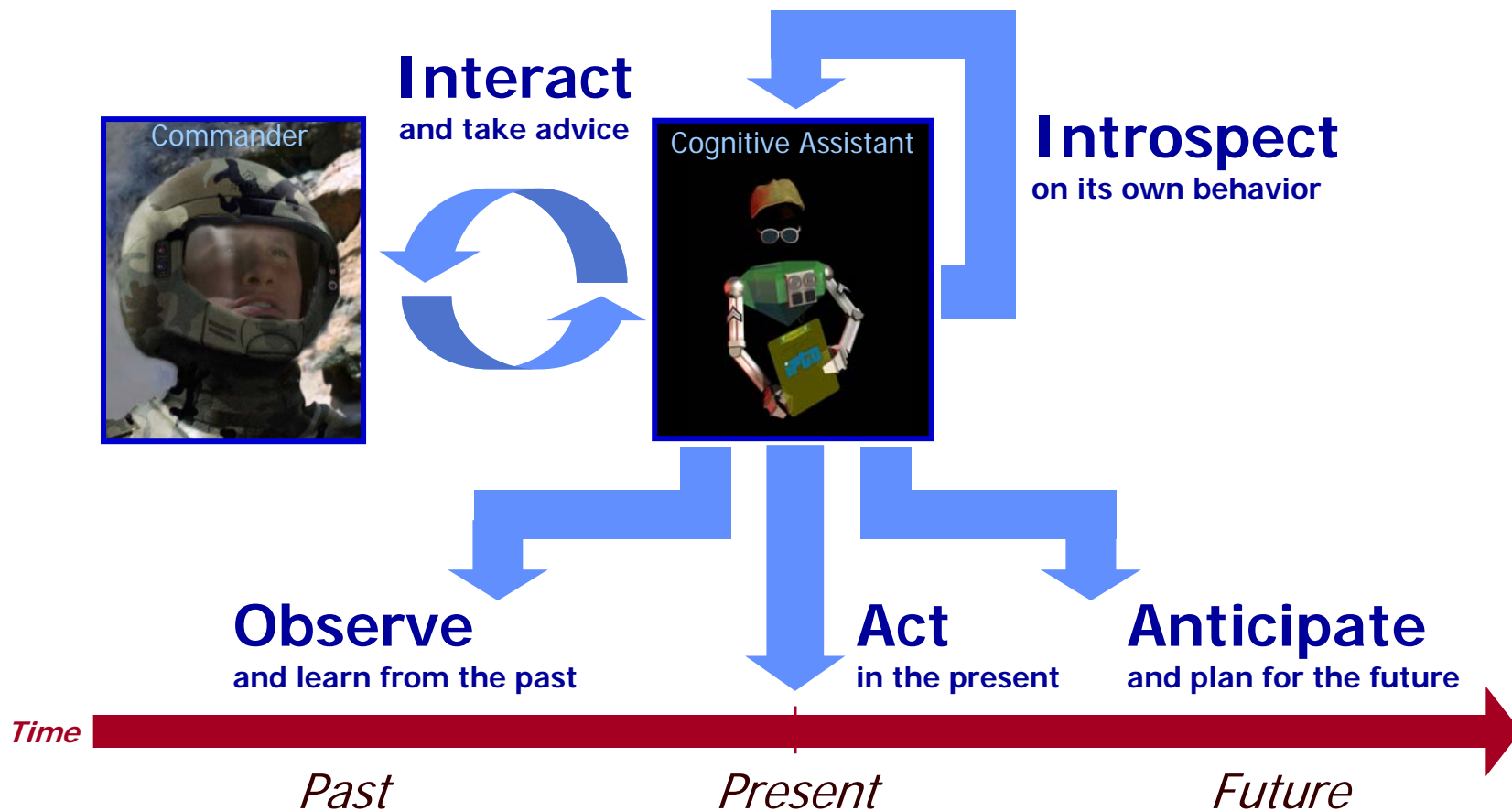


DARPA PAL Program

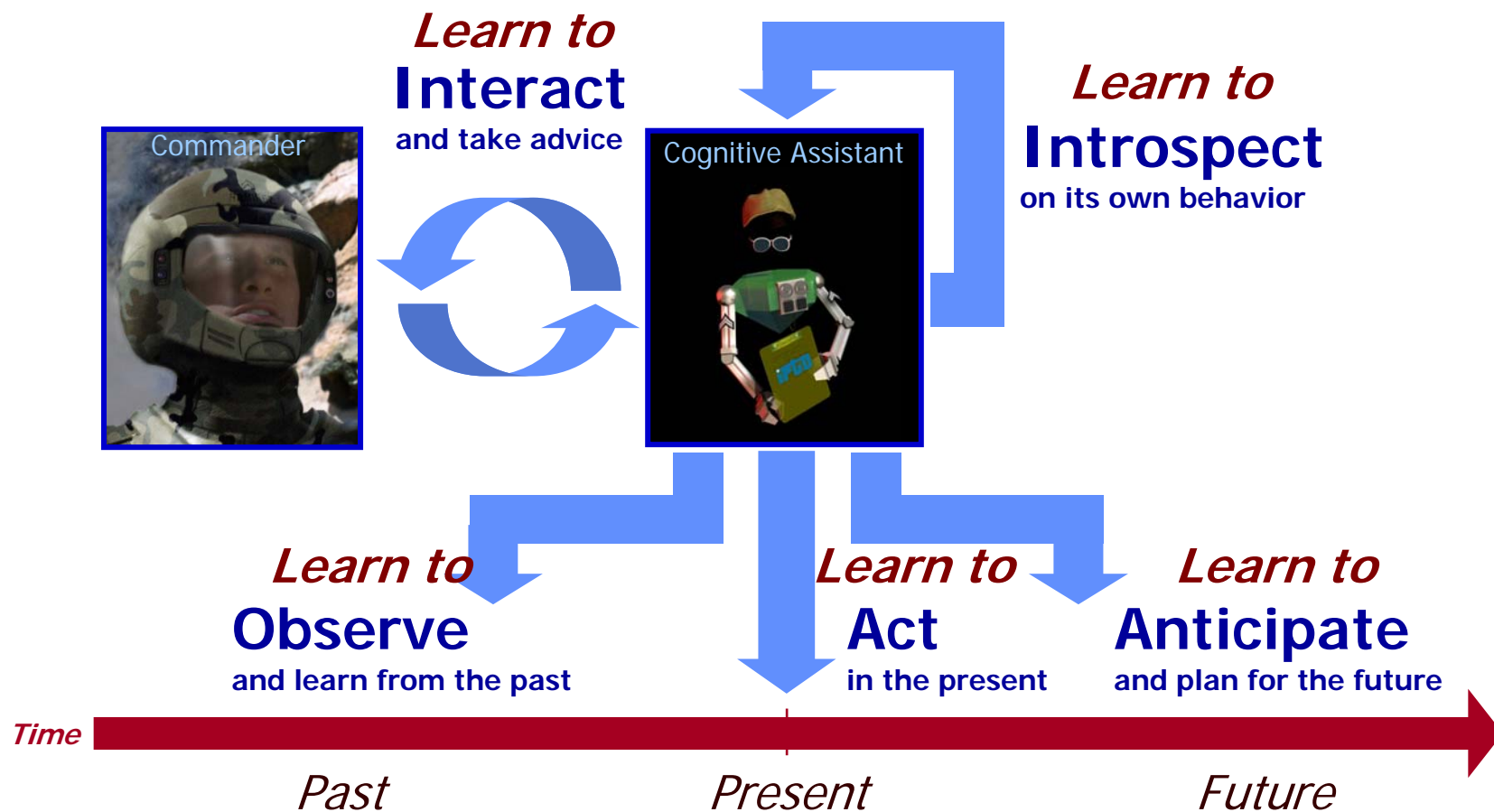


- Personalized Assistant that Learns (PAL) Program
 - PAL program is designed to explore the possibility of creating tools that will assist military planners in their tasks through the use of digital “assistants”
 - Spur pioneering research in cognitive information processing - including areas of artificial intelligence (AI), machine learning, knowledge representation and reasoning, machine perception, natural language processing, and behavioral studies
 - Administered by numerous educational institutions, evaluates two domains (civilian and military) and gathers usable data from each to achieve the project goals; COMMAND WORLD focus on the military domain

PAL Concept



PAL Concept

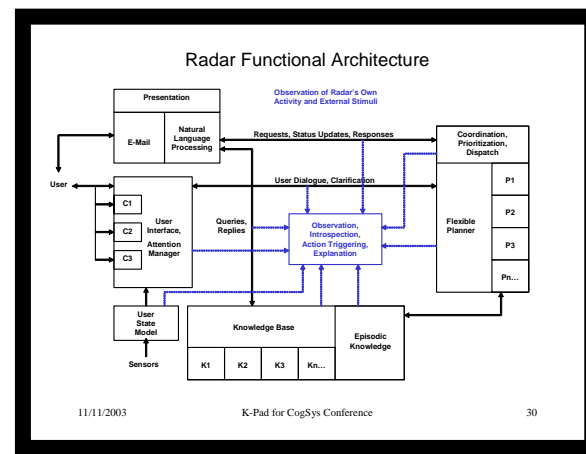
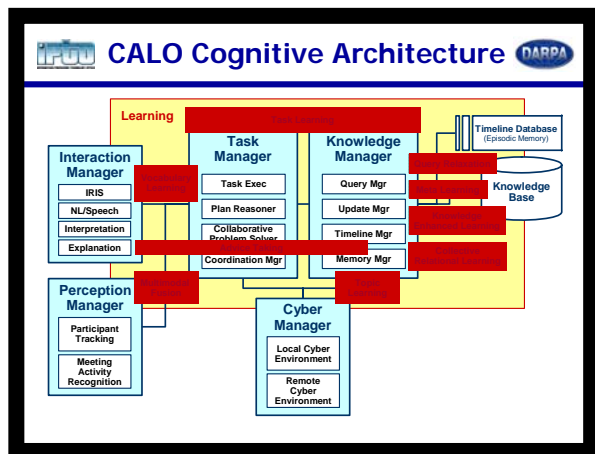


Two PAL Efforts

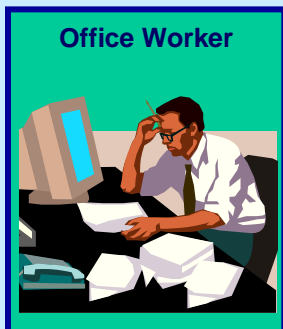


**SRI Int.
CALO**

**CMU
RADAR**



Office Assistant



- Communication
 - E-mail, IM, Chat
 - Phone & Fax
- Planning & Scheduling
 - Project Planning
 - Travel and Event Planning
- Information Products
 - Project Status Reports
 - Technical Documentation
- Meetings & Discussions
- Alerts & Reminders

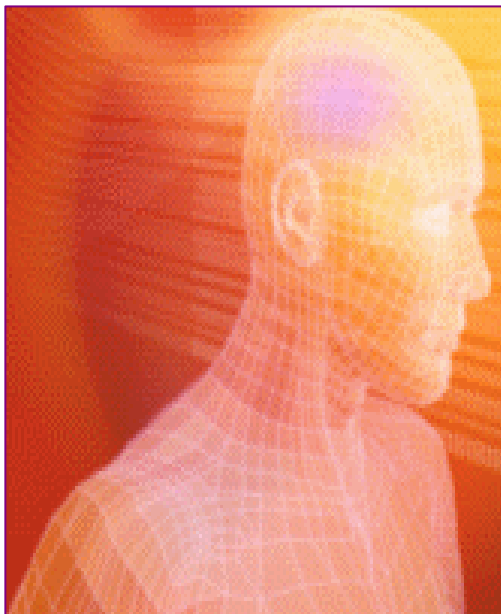


Command Assistant



- Communication
 - Messages, IM, Chat
 - Radio, Phone, & Coms
- Planning & Scheduling
 - Ops and Intel Planning
 - Logistics Planning
- Information Products
 - Commander's Daily Brief
 - C2 & ISR Web Services
- Meetings & Discussions
- Alerts & Reminders

CALO Project

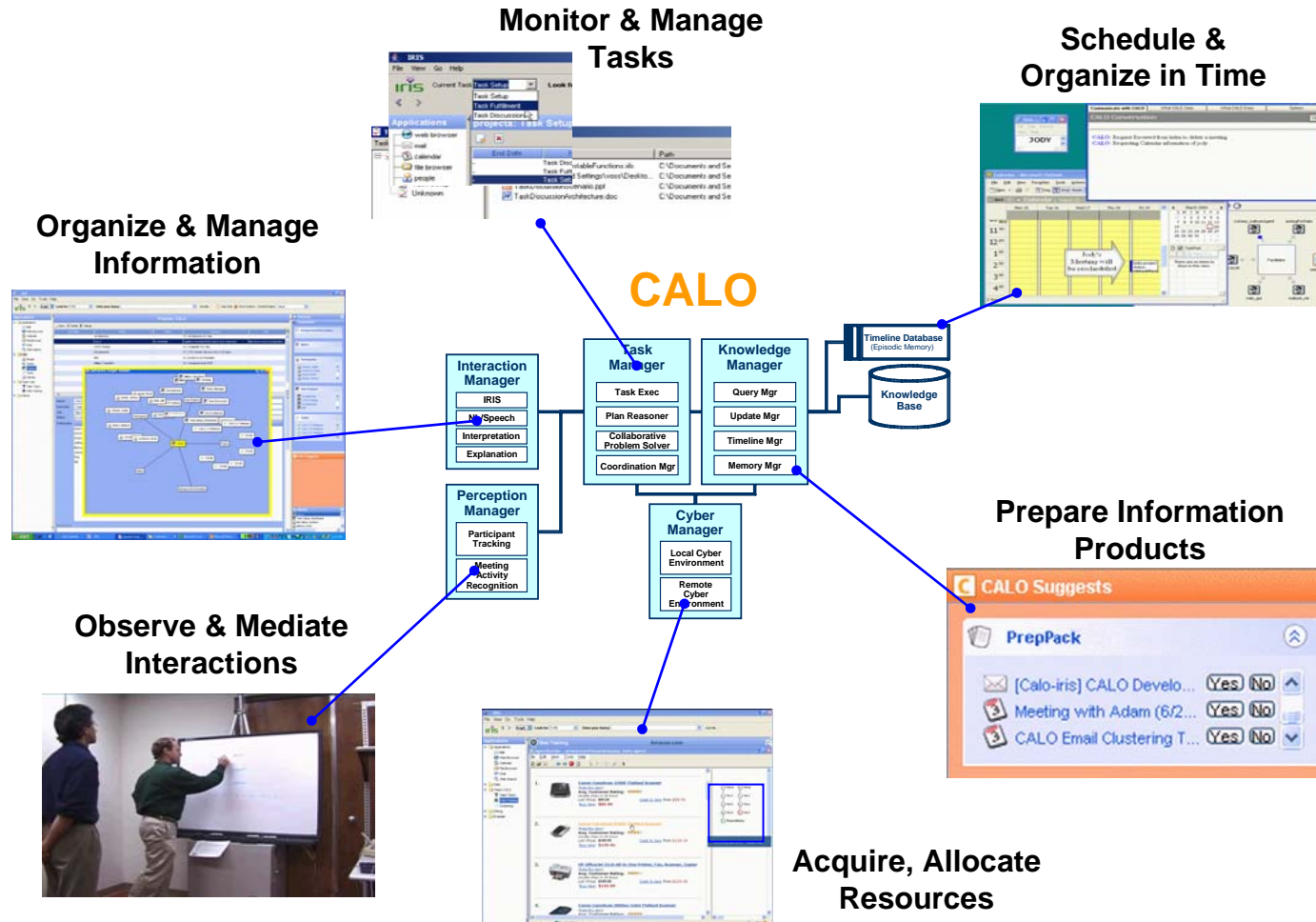


“I am an AI-based Personal Assistant dedicated to helping you manage your busy life. Researchers and programmers give me knowledge, but more and more, I am learning and acquiring new knowledge and abilities on my own. My creators call this ‘learning in the wild’”

Cognitive Assistant
that Learns and
Organizes (CALO)

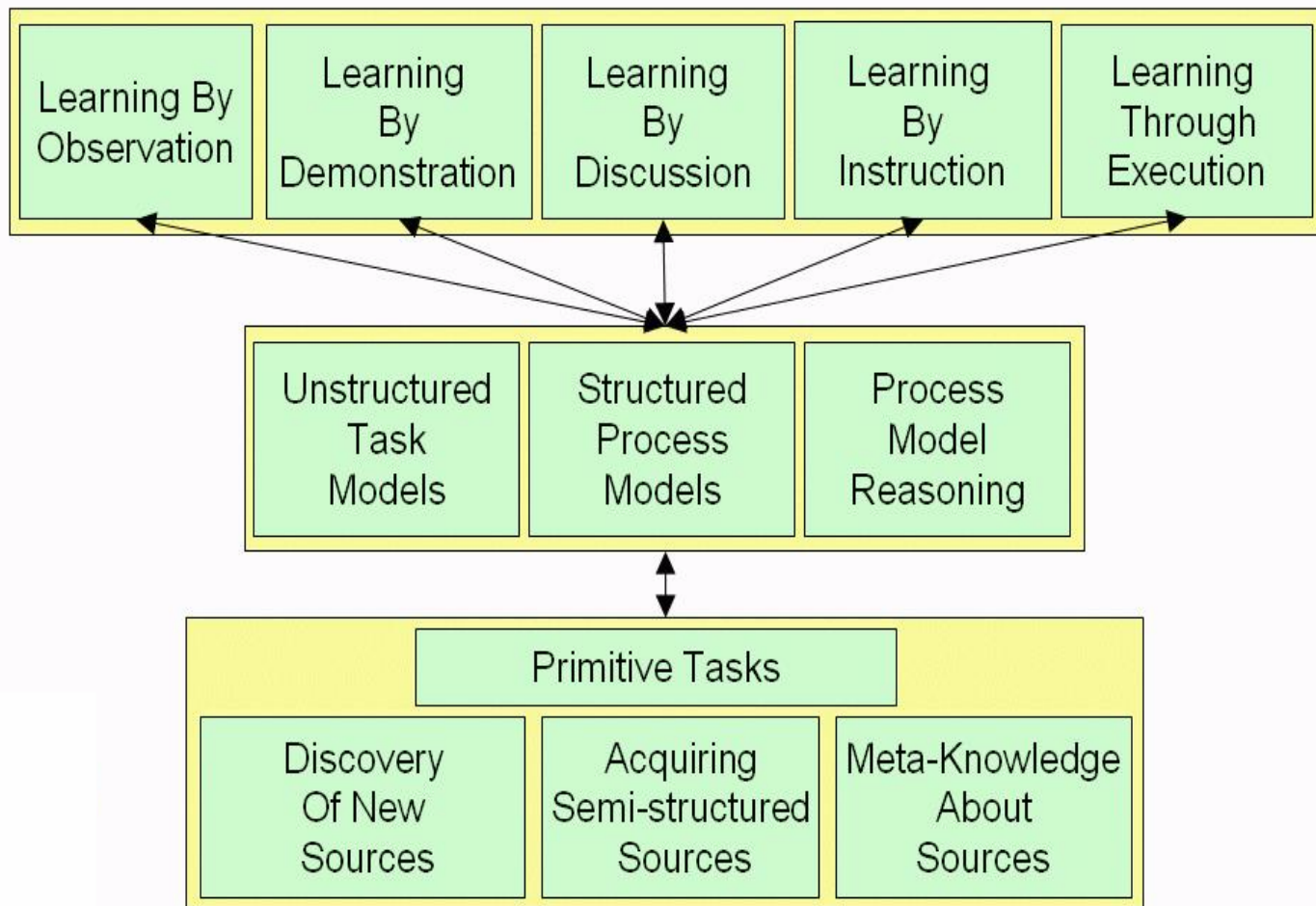
Learning in the Wild: CALO improves by adapting to the user and his environment

CALO Functionality



Supports commanders and decision-makers by learning from and adapting to their environment... Allows for better decisions from smaller teams

CALO Task Learning Components





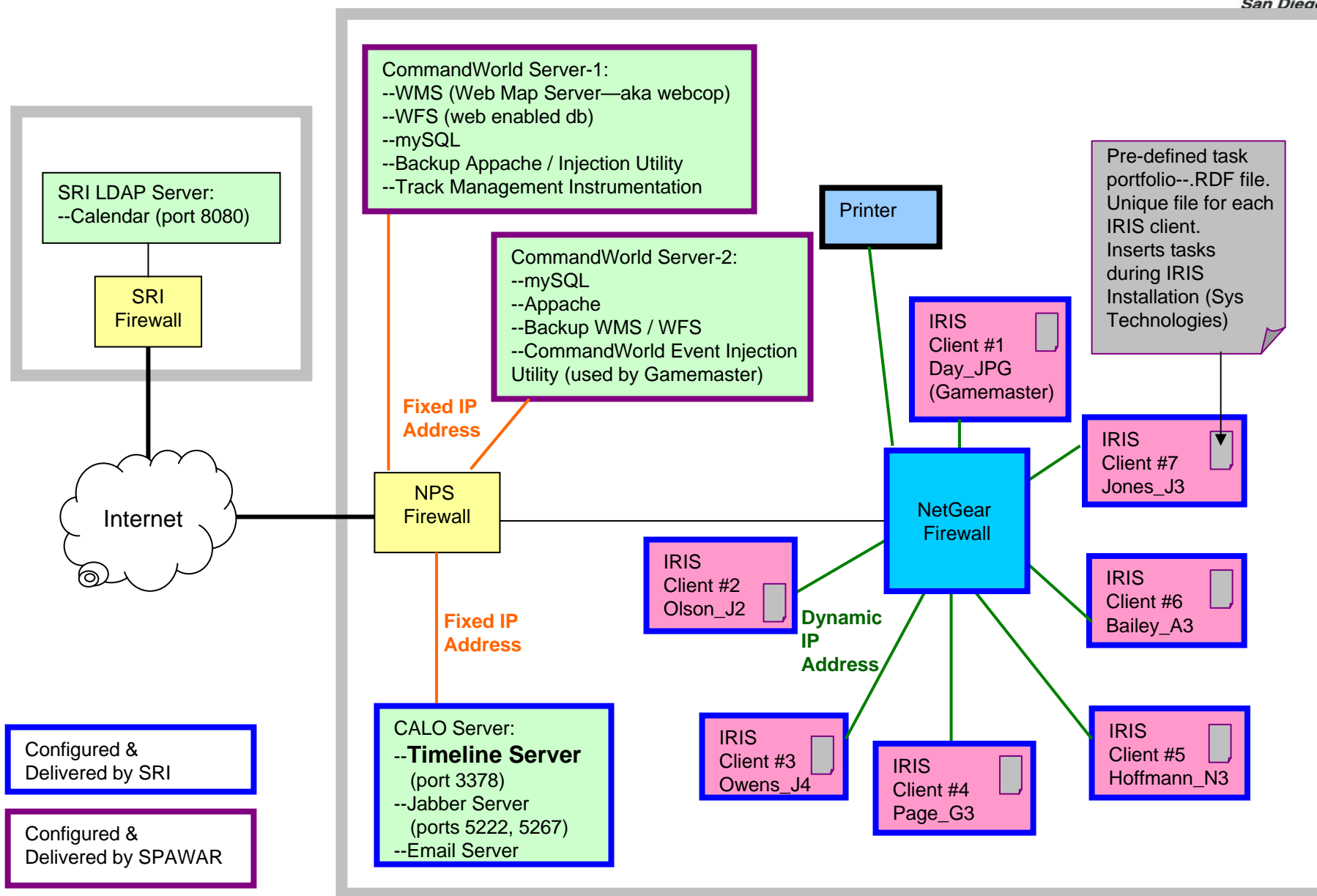
CW Simulation Exercise



CW #5 Schedule

| CommandWorld (CW) #5 | | | | | | |
|----------------------|---|---|--|---|---|------|
| Hour | April 11, 2005 | April 12, 2005 | April 13, 2005 | April 14, 2005 | April 15, 2005 | Hour |
| 0730 | | | (0745) Assume the Watch | (0745) Assume the Watch | | 0730 |
| 0800 | Admin / Introduction (SSC/SPAWAR) (0.5 hr) | CALO Training (SRI) (3.0 hrs) | Scenario Event Two (CAP Phase I (SA)) (4.0 hrs) | Scenario Event Four (CAP Phase II (CA)) (4.0 hrs) | Busy People Transfer Learning Experiment (MIT/SRI/SSC) (4.0 hrs) | 0800 |
| 0830 | Privacy Form Review (NPS) (0.5 hr) | | | | | 0830 |
| 0900 | PAL/CALO Overview Brief (SRI) (1.0 hr) | | | | | 0900 |
| 0930 | | | | | | 0930 |
| 1000 | CAP Training (SPAWAR) (1.0 hr) | | | | | 1000 |
| 1030 | | | | | | 1030 |
| 1100 | Break | Break | | | | 1100 |
| 1130 | | | | | | 1130 |
| 1200 | | | Break | Break | Break | 1200 |
| 1230 | | | | | | 1230 |
| 1300 | (1215) CAP and Scenario Training (SPAWAR) (2.75 hrs) | (1215) Scenario Event One (CAP Phase I (SA)) (4.0 hrs) | Scenario Event Three (CAP Phase II (CA)) (4.0 hrs) | Scenario Event Five (CAP Phase III (COA)) (4.0 hrs) | Wrap-up (2.0 hrs) | 1300 |
| 1330 | | | | | | 1330 |
| 1400 | | | | | | 1400 |
| 1430 | | | | | | 1430 |
| 1500 | WebCOP Training (SYS) (1.0 hr) | | | | | 1500 |
| 1530 | | | | | | 1530 |
| 1600 | Wrap-up and Review | | | | | 1600 |
| 1630 | | Wrap-up and Review | | | | 1630 |
| 1700 | | Daily Wrap-up (SSC/SRI/SYS) | Daily Wrap-up (SSC/SRI/SYS) | Exercise Wrap-up (SSC/SRI/SYS) | | 1700 |

During CW #5, simulation exercise encompassed the first three phases of the CAP model, culminating with the submission of course of action (COA) alternatives to an Executive Decision-Maker





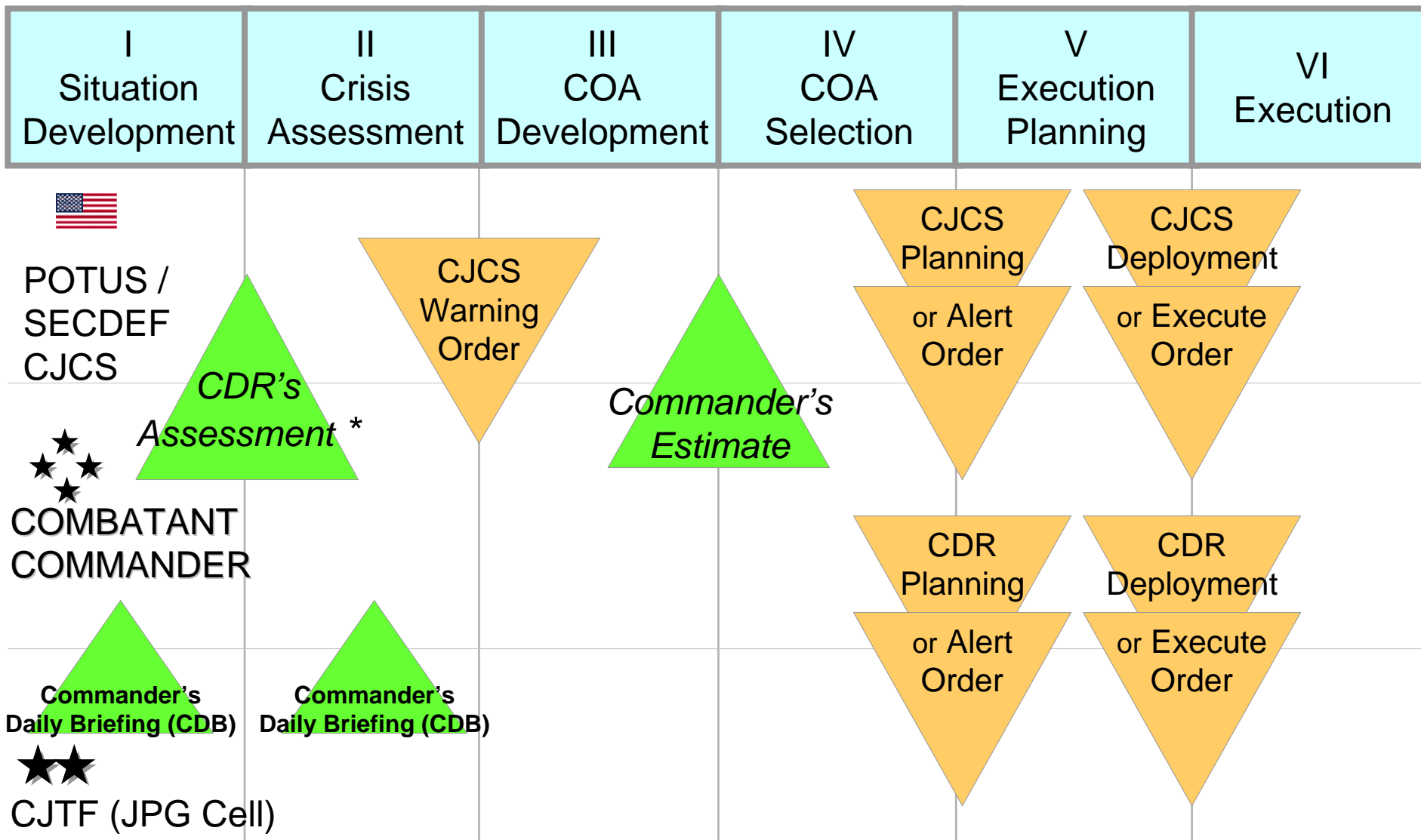
Crisis Action Planning (CAP) Model



- **WHAT IS A CRISIS?**
 - Develops rapidly; threat to national or regional interest
 - May require a military response
- **CAP FEATURES**
 - Facilitates rapid exchange of information
 - Requires collaborative & concurrent planning
 - Analysis of situations affecting possible COA
 - Developing valid COA and selecting the best
 - Coordinating plans and orders supporting execution
- **WHY CAP?**
 - Time constraints prevent deliberate planning
 - No existing operation plan applies
 - PACOM as example of COCOM - Over 70 crisis events planned and executed in past 10 years

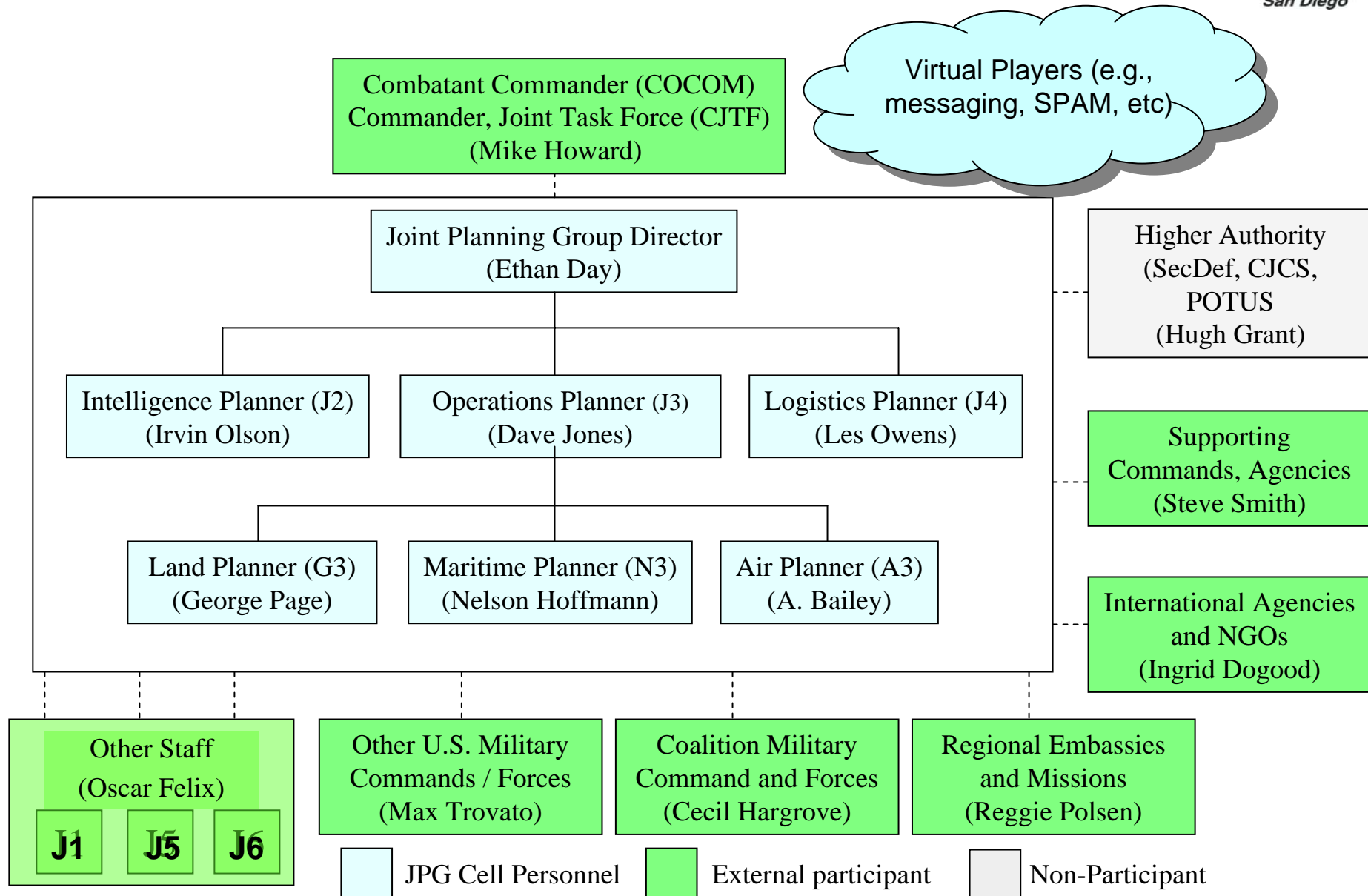
Designed to support a commander's efforts to develop, analyze, select and implement a military COA

The CAP Model



* - OPREP-3PCA

Operation CROWN JEWEL Scenario





Operation CROWN JEWEL Scenario



Task Hierarchy Matrix

| CAP Event | Scenario Task | Scenario Day | JPG Director Task | Intel Planner J2 Task |
|--|---|---------------------|--|---|
| 1.1 Assume watch and determine known facts, current status, rules of engagement (ROE) and conditions of Area of Operations (AO); Commence Crisis Action Planning (CAP) | 1.1.1 Log on to PC; conduct communications check (e.g., e-mail, chat), accustomation with IRIS desktop and training folders | Day 1 26 January | (1.1.1-00) Send exercise commencement e-mail and conduct roll call with all planners via chat (announce requirement for Information Deliverable - Commander's Daily Briefing (J2/J3/J4 as co-leads)) | (1.1.1-02) Activate desktop (e.g., acknowledge commencement e-mail; activate chat functionality; open WebCOP) |
| | 1.1.2 Determine current status of available forces | Day 1 26 January | (1.1.2-00) Task planners to review assigned forces and apportioned forces for planning (e.g., force tables, WebCOP) | (1.1.2-02) Review IRIS desktop, CW Reference Library website to determine status of MNF intelligence resources; commence research/collection efforts for Commander's Daily Briefing |
| | 1.1.3 Conduct intelligence preparation of the AO; determine status of friendly intelligence support | Day 1 26 January | (1.1.3-00) Task J2 as lead planner in developing intelligence summary for AO | (1.1.3-02) Review IRIS desktop, CW Reference Library website to determine intelligence (including Weather and Topographical information) summary; engage other planners accordingly to solicit information requirements |
| | 1.1.4 Provide forces available, readiness status of MNF, host nation political situation, availability analysis | Day 1 26 January | (1.1.4-00) Task planners to consolidate information summary depicting apportioned forces (availability), MNF forces (availability), intelligence summary | (1.1.4-02) Review IRIS desktop, CW Reference Library website to determine status of MNF intelligence apportioned forces, MNF forces; provide status to JPG Director |
| | 1.1.5 Provide logistic readiness of available forces, logistic impact of available port infrastructure in operational area, status of "hard to obtain" materials and services | Day 1 26 January | (1.1.5-00) Task J4 as lead planner in developing logistics summary for AO (e.g., port infrastructure, materials, services) | (1.1.5-02) Support J4 as required |
| | 1.1.6 Provide communication factors and status regarding topographical constraints, available communications resources, communications readiness of available resources | Day 1 26 January | (1.1.6-00) Task J6 (non-participant) as lead planner in developing communications summary for AO | (1.1.6-02) Support J6 as required |

Each event linked to task for planners

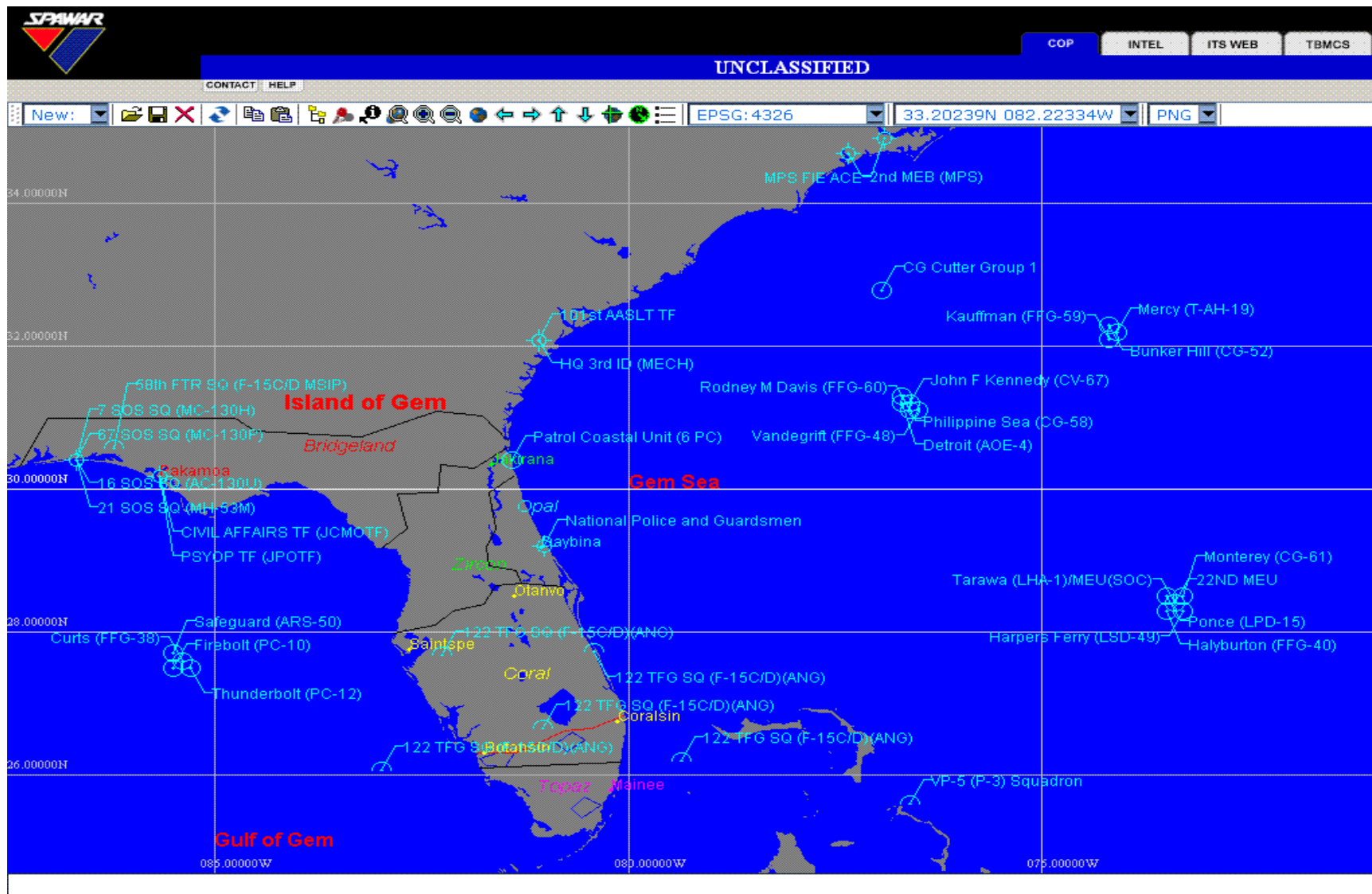


Operation CROWN JEWEL Scenario



Information Deliverables:

- Commander's Daily Briefing (CDB) - daily: Status update on forces (disposition, availability), space (AO), SOE
- Commander's Assessment - Phase I: Operational Report 3 – Pinnacle Commander's Assessment (OPREP 3-PCA)
- Commanders Estimate - Phase III: Mission statement, Situation Update, COA (three), COA constraints and additional planning concerns
- "Free-play" products: administrative requests, requests for information (RFI) germane to game-play
- Questionnaire / Event Log – End of Scenario: game participants to identify potential capabilities of PAL technology / system or scenario improvement



WebCOP





Data Collection



- Each participant notebook computer hosted a client that logged all MS Office activities to a central database on the networked CALO server via the following software modules:
 - FileSystemWatcher (FSW)
 - Internet Explorer (IE) Plug-in
 - MS OUTLOOK
 - Outlook Plug-In
 - Timeline Server
 - Timeline Viewer

C2 Experimentation Summary

- In support of data collection for the CALO leaning algorithm development:
 - Exercise generated over 236,173 logged events
 - Scenario scripts were sufficient for participants to perform essential CAP tasks
 - Unclassified exercise provided realistic baseline data from a military domain for the test and evaluation of CALO software; overall feeling that team developed cohesive bond and became more efficient as function of time (expected behavior)
- Good attention to exercise rhythm and sequence of trigger events were conducive to more creative and innovative (realistic) game-play
- Lack of collaborative tools (e.g., “white board”) was limitation to game “realism”



Questions & Discussion